

MONTHLY WEATHER REVIEW.

Editor: Prof. CLEVELAND ABBE.

VOL. XXIV.

JULY, 1896.

No. 7

INTRODUCTION.

The REVIEW for July, 1896, is based on 2,746 reports from stations occupied by regular and voluntary observers, classified as follows: 149 from Weather Bureau stations; 33 from U. S. Army post surgeons; 2,421 from voluntary observers; 33 from Canadian stations; 1 from Hawaii; 96 received through the Southern Pacific Railway Company; 14 from U. S. Life-Saving stations. International simultaneous observations are received from a few stations and used together with trustworthy newspaper extracts and special reports.

The WEATHER REVIEW is prepared under the general editorial supervision of Prof. Cleveland Abbe. Unless otherwise specifically noted, the text is written by the Editor, but the statistical tables are furnished by Mr. A. J. Henry, Chief of the Division of Records and Meteorological Data. Special acknowledgment is made of the hearty cooperation of Prof. R. F. Stupart, Director of the Meteorological Service of the Dominion of Canada, Mr. Curtis J. Lyons, Meteorologist to the Government Survey, Honolulu, and of Dr. Mariano Bárcena, Director of the Central Meteorological Observatory of Mexico.

CLIMATOLOGY OF THE MONTH.

GENERAL CHARACTERISTICS.

The pressure has been high off the south Atlantic Coast, and also off the north Pacific Coast, and the interior low pressure has been about normal. Consequently the distribution of winds has also been normal and the mean temperatures for the month have shown no large abnormality. There was a general excess of temperature on the Pacific Coast and a general deficiency in the interior of the continent. Although several stations on the north Pacific and Plateau regions reported the highest mean temperature on record, yet the greatest excess was but 4.2°. An unusual number of stations reported heavy local rains and consequent disastrous floods over very restricted areas; the greatest departures from normal precipitation at regular stations of the Weather Bureau were the excesses in Kansas, Missouri, Arkansas, Illinois, Mississippi, Ohio, Kentucky, West Virginia, Louisiana, and Alabama. An injurious drought was reported from limited portions of Arkansas, Louisiana, Mississippi, and Texas, also, in Washington and Oregon.

ATMOSPHERIC PRESSURE.

[In inches and hundredths.]

The distribution of mean atmospheric pressure reduced to sea level, as shown by mercurial barometers, not reduced to standard gravity, and as determined from observations taken daily at 8 a. m. and 8 p. m. (seventy-fifth meridian time), is shown by isobars on Chart IV. That portion of the reduction to standard gravity that depends on latitude is shown by the numbers printed on the right-hand border.

The mean pressures during the current month were highest on the coast of the South Atlantic States and Washington. They were lowest in Arizona and southern California, and low in the Gulf of St. Lawrence.

The highest were: Charleston, 30.16; Jacksonville, Jupi-

ter, and Tampa, 30.15; Wilmington and Savannah, 30.14. The mean for Bermuda was 30.27.

The lowest were: Yuma, 29.78; Prince Albert, 29.82; Fresno, Phoenix, and Red Bluff, 29.84; Grindstone Island, 29.85; Sacramento, 29.86; Father Point, 29.87; Medicine Hat, 29.89.

As compared with the normal for July, the mean pressure was in excess throughout the country east of the Rocky Mountains; in the South Atlantic Coast States it was greatest. It was slightly deficient over the Pacific States. The greatest excesses were: Charleston, 0.12; Wilmington, 0.11; Kittyhawk, Hatteras, Augusta, Jacksonville, Edmonton, and Minnedosa, 0.10. The greatest deficits were: Portland, Oreg., Walla Walla, and Eureka, 0.04; Sacramento and Fresno, 0.03.

As compared with the preceding month of June, the pressures, reduced to sea level show a rise everywhere, except a slight fall on the Pacific Coast. The greatest rises were: Wilmington, Charleston, Jacksonville, Tampa, and Bermuda, 0.11; Hatteras, Savannah, Jupiter, Atlanta, Montgomery, Mobile, New Orleans, Galveston, Palestine, Abilene, Santa Fe, and Edmonton, 0.10. The greatest falls were: Portland, Oreg., Walla Walla, and Roseburg, 0.08; Eureka, 0.07.

AREAS OF HIGH AND LOW PRESSURE.

By Prof. H. A. HAZEN.

The general conditions of the month of July have been as follows: A persistent low pressure to the north of Montana from which 10 of the 11 storms of the month have taken their origin. Four of the high areas of the month have also originated to the north of Montana, but these have been of very slight magnitude. There were 11 storms and 7 high areas of sufficient definiteness to be traced, and their trajectories, with barometer reading twice each day, will be found on Charts I and II, respectively. Some of the more prominent facts relating to the place of origin, velocity of apparent motion,

and duration of path will be found in the accompanying table.

Movements of centers of areas of high and low pressure.

Number.	First observed.			Last observed.			Path.		Average velocities.	
	Date.	Lat. N.	Long. W.	Date.	Lat. N.	Long W.	Length.	Duration.	Daily.	Hourly.
High areas.										
I.....	3, a.m.	48	108	6, a.m.	40	94	1,330	3.0	440	18.3
II.....	5, a.m.	53	109	8, p.m.	47	84	1,610	3.5	460	19.2
III.....	13, a.m.	48	129	18, p.m.	44	63	2,990	5.5	599	25.0
IV.....	20, p.m.	54	116	23, a.m.	48	98	910	2.5	362	15.1
V.....	23, a.m.	51	116	26, a.m.	37	74	2,330	3.0	778	32.4
VI.....	26, p.m.	47	104	28, p.m.	42	87	940	2.0	471	19.6
VII.....	29, a.m.	54	110	31, p.m.	44	81	1,560	2.5	624	26.0
Sums.....							11,660	22.0	3,734
Mean of 7 paths.....									533	22.2
Mean of 22.0 days.....									530	22.1
Low areas.										
I.....	1, a.m.	52	103	5, a.m.	43	72	2,240	4.0	560	23.3
II.....	6, a.m.	52	117	8, p.m.	51	98	870	2.5	347	10.9
III.....	6, p.m.	29	93	10, a.m.	47	86	1,650	3.5	471	19.7
IV.....	8, p.m.	50	110	11, a.m.	54	102	610	2.5	244	10.2
V.....	13, p.m.	50	106	16, p.m.	48	61	2,160	3.0	720	30.0
VI.....	15, p.m.	52	115	19, p.m.	41	90	1,870	4.0	468	19.5
VII.....	18, p.m.	52	112	21, p.m.	49	63	2,480	3.0	827	34.5
VIII.....	20, a.m.	48	111	23, p.m.	48	58	2,690	3.5	770	32.1
IX.....	20, p.m.	46	117	25, p.m.	44	64	3,330	5.0	667	27.8
X.....	24, a.m.	54	107	27, p.m.	42	83	1,960	3.5	531	22.1
XI.....	27, p.m.	50	116	31, p.m.	46	59	2,790	4.0	697	29.0
Sums.....							22,550	38.5	6,302
Mean of 11 paths.....									573	22.6
Mean of 38.5 days.....									529	22.0

LOCAL STORMS.

By A. J. HENRY, Chief of Division of Records and Meteorological Data.

There were about the usual number of local storms, torrential rains, and damaging hailstorms during the month. No remarkable tornadoes occurred, but possibly some of the local violent winds were really incipient tornadoes. Minor tornadoes were reported in North Carolina and Virginia on the 8th, and in South Carolina on the 15th. Very severe local storms were experienced in Michigan, Iowa, Ohio, and Pennsylvania on the 26th and 27th, and damaging hailstorms occurred in South Dakota, Iowa, and Indiana on the 26-27th. The loss to crops in South Dakota on this occasion probably exceeded \$100,000. Careful estimates of loss in Iowa in the counties of Woodbury, Cherokee, Plymouth, Ida, Sac, Buena Vista, and Calhoun place the damage to crops at \$200,000.

The record by dates follows:

4th.—A severe squall wind passed over Cedar Point about 3 miles northeast of Sandusky, Ohio, capsizing a number of yachts and pleasure boats. One person was drowned.

6th.—Bucklin, Ford County, Kans., was visited by a severe wind, rain, and hail storm, reported as moving toward the southwest. The width of the storm was about 5 miles; its length was probably not over 15 miles. The damage was confined to windmills, small buildings, fruit crops, and poultry.

7th.—A severe windstorm began on the west Florida coast on the morning of the 7th, increasing in force as the day advanced. The maximum velocity of the wind at Pensacola (72 miles per hour from the southeast) was reached at 11.45 a. m. Much damage was done in that city. About 35 houses were unroofed, and there was a general destruction of signs, awnings, telegraph and telephone wires, smokestacks, windmills, etc. The greatest destruction, however, occurred in the harbor, and on the water front. Nine fishing smacks were sunk; one brig dragged her anchor and was washed ashore; two barks were badly damaged and a number of smaller craft wrecked and sunk. The property loss has been estimated as high as \$400,000 in Pensacola alone, but that

statement seems excessive. Probably \$100,000 would be nearer the true figures. Strong winds were also reported at Eufaula, Ala., and Winston, N. C.

8th.—An incipient tornado formed in Halifax County, N. C., at 9.30 a. m., and moved northeastward in a path about 60 or 70 feet wide. At Spring Hill several houses and a number of outbuildings were blown down: one person was killed. Length of track uncertain, but probably not over 10 miles. The property loss was about \$1,000. Later in the day what appears to have been a series of minor tornadoes was observed in Dinwiddie and Prince George counties, Va. Reports as to the general direction of the storms are somewhat conflicting. The observer at Reams Station reports a storm moving northwest. Two independent reports from Templeton almost due east of the first-named point give the direction as "a little east of north" and "north," respectively. The observer at Disputanta reports the storm as moving northwest. Funnel clouds were also seen moving in a northeasterly direction toward Williamsburg; 5 persons were injured; property loss about \$1,200. The path of the main storm varied in width from 50 to 200 yards; its length was probably 20 miles, but there was no destruction over a portion of its course.

14th.—A heavy wind and rain storm visited southern Michigan. The damage done at Grand Haven was estimated at \$20,000.

15th.—A minor tornado, or what might be called an overgrown whirlwind, was observed about 2 miles north of Harts-ville, S. C. One dwelling was blown down, and one person injured. The whirlwind's path was about 300 feet wide and 3 or 4 miles long; loss insignificant. Cincinnati, Ohio, was visited by a severe thunderstorm. The damage was confined principally to telephone wires, trees, awnings, truck and flower gardens, and suburban roads. A series of severe thunderstorms swept over the portions of West Virginia bordering on the Ohio River, from Parkersburg to the upper end of the Pan Handle, and extending back into the interior as far as Lewis and Harrison counties. Houses, bridges, and sawmills were swept away on the headwaters of the upper Little Kanawha, and on other streams emptying into the Ohio. The rainfall was very heavy throughout Ohio, east Tennessee, and western Pennsylvania. At Pittsburg the rain was very heavy. The street car lines, with but one exception, were wrecked, and considerable damage was done to houses and their contents by flooding. The early newspaper accounts of the damage done in Pittsburg were much exaggerated.

19th.—Damaging hailstorms were reported a few miles north of Aberdeen, S. Dak.

23d.—General rains fell over Illinois on this date. In a few cases the winds were unusually strong, and considerable damage was done to the crops, fences, and standing timber.

25th.—An incipient tornado or waterspout was observed in the suburbs of New Orleans. The damage done was insignificant, and the tornado disappeared in the direction of Lake Pontchartrain.

26th.—An unusually destructive hailstorm passed over a strip of country about 60 miles in length, and from 5 to 10 miles in width, in the southeastern part of South Dakota. The storm originated in the eastern part of Bon Homme County, traveled southeast through the counties of Yankton, Clay, and Union, across the Big Sioux River near Akron, and was last reported in the northwestern part of Plymouth County, Iowa.

Another destructive hailstorm passed through Jerauld County, S. Dak., destroying every vestige of crops in its path, in a strip about 20 miles long and 4 miles wide. The damage in the last-named county was estimated at \$25,000; the damage in Yankton County was estimated at \$100,000; no reports have been received as regards the damage in Clay and Union